System Board D2300 for RX200 S3

Technical Manual

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Contents

1 Introduction

This technical manual describes the system board D2300, which is equipped with one or two Intel® processors.

Further information you will find in the BIOS description.

For additional driver information, refer to the Readme files located on the server hard disk and on the supplied "Update CDs" or the "ServerStart" CD.

Notational conventions

The meanings of the symbols and fonts used in this manual are as follows:

italics	indicates commands, menu options or software programs.
`fixed font`	indicate system output on the monitor.
semi-bold fixed font	indicates values to be entered through the keyboard.
Key symbol	indicates keys according to their representation on the keyboard.
	If capital letters are to be entered explicitly, then the Shift key is shown, e.g. SHIFT - A for A.
	If two keys need to be pressed at the same time, then this is shown by placing a hyphen between the two key symbols.
"Quotation marks"	Indicates names of chapters and terms that are being emphasized.
►	Describes an operation that must be performed.
⚠ **CAUTION!**	Pay particular attention to texts marked with this symbol. Failure to observe these warnings may endanger your life, destroy the system or lead to the loss of data.
i	Indicates additional information, notes and tips

Table 1: Notational conventions

2   Important notes

In this chapter you will find essential information regarding safety when working with your server.

⚠ **CAUTION!**

With the system board installed you must open the system to access the system board. How to dismantle and reassemble the system is described in the service manual accompanying your system.

When installing the system board, refer to the specific installation information in the operating and/or service manual for the receiving server.

2.1   Notes on safety

⚠ **CAUTION!**

- The actions described in these instructions should only be performed by authorized, qualified personnel. Equipment repairs should only be performed by qualified staff. Any failure to observe the guidelines in this manual, and any unauthorized openings and improper repairs could expose the user to risks (electric shock, fire hazards) and could also damage the equipment. Please note that any unauthorized openings of the device will result in the invalidation of the warranty and exclusion from all liability.

- Transport the device only in the antistatic original packaging or in packaging that protects it from knocks and jolts.

- Only install expansions that are allowed for the system board. If you install other expansions, you may damage the requirements and rules governing safety and electromagnetic compatibility or your system. Information on which system expansions are approved for installation can be obtained from our customer service center or your sales outlet.

- The warranty expires if the device is damaged during the installation or replacement of system expansions.

● Components can become very hot during operation. Ensure you do not touch components when making extensions to the system board. There is a danger of burns!

● Transmisson lines to peripheral devices must be adequately shielded.

● To the LAN wiring the requirements apply in accordance with the standards EN 50173 and EN 50174-1/2. As minimum requirement the use of a protected LAN line of category 5 for 10/100 Mbps Ethernet, and/or of category 5e for Gigabit Ethernet is considered. The requirements of the specification ISO/IEC 11801 are to be considered.

● Never connect or disconnect data transmission lines during a storm (risk of lightning hazard).

Batteries

CAUTION!

● Incorrect replacement of lithium battery may lead to a risk of explosion. The batteries may only be replaced with identical batteries or with a type recommended by the manufacturer.

It is essential to observe the instructions in the chapter "Replacing the lithium battery".

Modules with electrostatic-sensitive components

Boards with electrostatic sensitive devices (ESD) are marked with the following label:
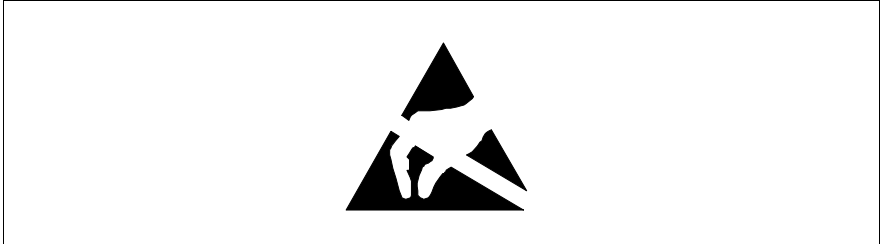

Figure 1: ESD label

You must follow the instructions below when handling modules containing electrostatic-sensitive components

● You must always discharge yourself of static charges (e.g. by touching a grounded object) before touching the components.

● The equipment and tools you use must be free of static charges.

● Remove the power plug from the power socket before inserting or removing boards containing ESDs.

● Always hold boards with ESDs by theit edges.

● Do not touch any exposed pins or conductors on a component.

● Use a grounding cable designed for this purpose to connect yourself to the system unit as you install/deinstall the board.

● Place all components on a static-free surface.

> **i** You will find a detailed description for handling ESD components in the relevant European or international standards (EN 61340-5-1, ANSI/ESD S20.20).

Notes about boards

● During installation/deinstallation of the system board, observe the specific instructions described in the service manual for the server.

● Remove the plug from the mains outlet so that system and system board are totally disconnected from the mains voltage.

● To prevent damage to the system board, the components and conductors on it, please take great care when you insert or remove boards. Take great care to ensure that extension boards are slotted in straight, without damaging components or conductors on the system board, or any other components, for example EMI spring contacts

● Be careful with the locking mechanisms (catches, centring pins etc.) when you replace the system board or components on it, for example memory modules or processors.

● Never use sharp objects (screwdrivers) for leverage.

2.2   CE Certificate of Conformity

The shipped version of this board complies with the requirements of the EEC directive 89/336/EEC "Electromagnetic compatibility".

Compliance was tested in a typical PRIMERGY configuration.

2.3   Environmental protection

Environmentally-friendly product design and development

This product has been designed in accordance with the Fujitsu Siemens
Computers standard for "environmentally friendly product design and devel-
opment". This means that key factors such as durability, selection and labeling
of materials, emissions, packaging, ease of dismantling and recycling have
been taken into account.

This saves resources and thus reduces the harm done to the environment.

Energy-saving information

Devices that do not need to be constantly switched on should be switched off
until they are needed as well as during long breaks and after completion of work.

Packaging information

Do not throw away the packaging. You may need it later for transporting the
system. If possible, the equipment should only be transported in its original
packaging.

Information on handling consumables

Please dispose of batteries in accordance with local regulations.

In accordance with EU directives, batteries must not be disposed of with
unsorted domestic waste. They can be returned free of charge to the manufac-
turer, dealer or an authorized agent for recycling or disposal.

All batteries containing pollutants are marked with a symbol (a crossed-out
garbage can). They are also marked with the chemical symbol for the heavy
metal that causes them to be categorized as containing pollutants:

Cd Cadmium
Hg Mercury
Pb Lead

To Germany applies:

– Private customers can return spent batteries free of charge at the point of sale or in its immediate proximity.

– The commercial end-user is legally obliged to return defective or spent batteries to the distributor or designated return and collection systems available to you.

Labels on plastic casing parts

Please avoid sticking your own labels on plastic parts wherever possible, since this makes it difficult to recycle them.

Returns, recycling and disposal

The device must not be disposed of with domestic waste. This device is labeled in compliance with European directive 2002/96/EG on waste electrical and electronic equipment (WEEE).
This directive sets the framework for returning and recycling used equipment and is valid across the EU. When returning your used device, please use the return and collection systems available to you. Further information can be found at *www.fujitsu-siemens.com/recycling*.

Details regarding the return and recycling of devices and consumables within Europe can also be found in the "Returning used devices" manual, via your local Fujitsu Siemens Computers branch or from our recycling center in Paderborn:

Fujitsu Siemens Computers
Recycling Center
D-33106 Paderborn

Tel.   +49 5251 8 18010

Fax   +49 5251 8 18015

3   Features

3.1   Overview

Processors

– 1 or 2 x Intel® Dual-Core Xeon™ processors

– 2 processor sockets LGA771 for Intel® Dual-Core Xeon™ processor with 667 / 1066 MHz front side bus (133/266 MHz quadruple transmission rate)

– 2 x 2 Mbyte (Intel Dual-Core 5000 sequence processor) or 1 x 4 Mbyte (Intel Dual-Core 5100 sequence processor), second level cache, ECC

– Support of SMP, MPS 1.4 compliant

– 2 x VRM 11.0 onboard (EVRD)

Main memory

– 8 slots for main memory FBD-533 and FBD-667 (FBD - Fully Buffered DIMMs) memory modules,
2 channel with 2 modules per channel with 512 MB, 1 Gbyte, 2 Gbyte and 4 Gbyte

– maximum 32 Gbyte of memory

– supports „4 way interleaved memory subsystems" (4 identical memory modules have to installed at the same time)

– ECC multiple bit error detection and single bit error correction

– memory scrubbing function

– Single Device Data Correction (SDDC) function (Chipkill™)

– memory mirroring function

Chips on the system board

– Intel® MCH (memory controller hub) chipset (north bridge)

– Intel® ESB2-V processor (south bridge)

– Intel® PXH-V hub for PCI bridge (Option 2, on page 15)

– Broadcom LAN controller (BCM 5715C)

– iRMC chipset with integrated graphics controller

– SAS controller (LSI 1068) with IME functionality

– Super I/O controller (SMSC DME 1737)

– Flash EPROM for:

   – IME firmware

   – BIOS

   – LAN

   – Server Management (SM)

internal connectors

– 1 IDE connector (CD-ROM/DVD-ROM)

– 1 SATA connector

– USB Type C (for USB port on front side)

– I2C connector

– main power connector (12V, -12V and 5V auxiliary supply)

– 12V (CPU) power connector

– IPMB connector

– HDD activity connector

– control panel

– battery holder

– connectors for PWM fans (Puls Wide modulation)

external connectors

– 1 serial port (COM1) for system and BMC (shared)

– 2 PS/2 interfaces for keyboard and mouse

– 4 USB 2.0 ports with 480 Mbits/s (2 x front, 2 x rear)

– 1 VGA port

– 2 RJ45 LAN port

PCI slots

There are two PCI expansion slots on the system board:

– PCI-X1 / PCI-X expansion slot

– PCI-Express x8 expansion slot

The riser boards on the PCI riser board assembly convert the functionality of the system board expansion slots to a pair of slots positioned at a 90° angle from the system board. There are two possible configuration.

– Option 1

  – One standard half length PCI Express x8 slot

  – One low-profile half length 64-bit/100 MHz PCI-X slot

– Option 2

  – One standard half length 64-bit/100 MHz PCI-X slot*

  – One low-profile half length 64-bit/100 MHz PCI-X riser board

  * The PXH-V daughter board is mounted on the PCI riser board assembly.

BIOS features

– Phoenix System BIOS V 4.06

– SMBIOS 2.31 (DMI)

– MultiProcessor Specification 1.4

– Server Hardware Design Guide 3.0

– WfM 2.0

– IPMI V2.0

– ACPI 1.0b support

– LSI SCSI BIOS with IME (Integrated Mirroring Enhanced)

– USB keyboard/mouse

– boot possible from:

  – CD-ROM

  – USB drive

  – LAN

– console redirection support

– OEM logo

– CPU, memory disable

– memory mirroring support

Environmental protection

Battery in holder

Form factor

249 x 455 mm

3.2   Main memory

The system board supports up to 32 Gbyte main memory. 8 slots (4 memory banks with 2 modules) are available for the main memory. Each memory bank must be equipped with two 512 Mbyte, 1 Gbyte, 2 Gbyte or 4 Gbyte (FBD - Fully Buffered DIMM) memory modules.

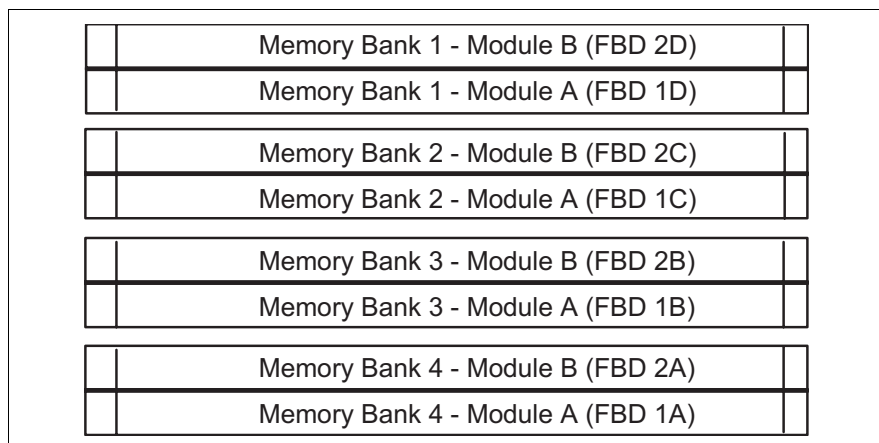ECC with memory scrubbing and with the Single Device Data Correction (SDDC) function is supported.

Memory Bank 1 - Module B (FBD 2D)
Memory Bank 1 - Module A (FBD 1D)
Memory Bank 2 - Module B (FBD 2C)
Memory Bank 2 - Module A (FBD 1C)
Memory Bank 3 - Module B (FBD 2B)
Memory Bank 3 - Module A (FBD 1B)
Memory Bank 4 - Module B (FBD 2A)
Memory Bank 4 - Module A (FBD 1A)

Figure 2: Structure of the memory in the memory banks and memory modules

Module population

–   The memory modules have to be registered Fully Buffered DIMMs (ECC DDR2 533/667).

–   The memory modules have to be populated in pairs.

–   Each pair must consist of identical memory modules.

–   Each memory bank and channel (module) must be equipped with 2 memory modules.

–   The module capacity between pairs can differ: pair 1A/1B can be populated with two 512 Mbyte modules and pair 2A/2B with two 1 Gbyte modules.

Install identical modules (of the same type, manufacturer, speed, timing, and organization) per the instructions below:

–   When operating in non-mirror mode:

    –   Install the first pair in the FBD 1A and FBD 1B slots.

    –   Memory upgrade granularity is two DIMMs.

    –   Observe the following channel pair sequence during installation:
        FDB 1C - FDB 1D, FBD 2A - FDB 2B, then FDB 2C - FDB 2D

–   When operating in single DIMM mode, the module should be installed in the FBD 1A slot.
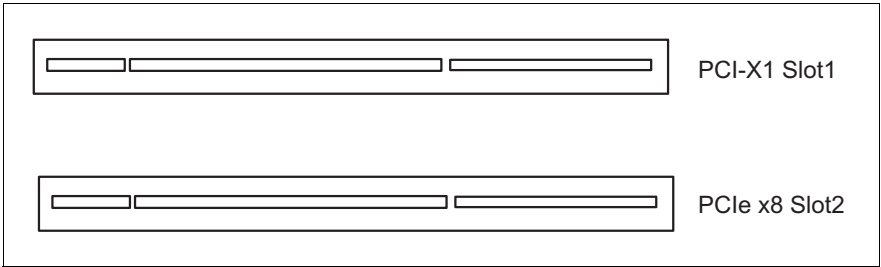
3.3   PCI-Bus

Figure 3: Representation of the PCI-outlets

PCI slots

The following table shows an overview of the PCI slots:

PCI slot	64Bit	Frequency in MHz	Description
1	64 bit	100/133	64 bit PCI-X slot, low profile
2	64 bit	133	64 bit PCIe x8 slot, low profile and full size

3.3.1   ISA bus resources

Device	IRQ	Address	DMA
Timer	0	040-043	
Keyboard	1	060.064	
Serial port COM1	4	3F8-3FF	
Floppy disk drive controller	6	3F0-3F5, 3F7	2
Ethernet controller	7		
Real-time clock (RTC)	8	070-071	
SCI interrupt	9		
SMB controller	9		
PS/2 mouse controller	12		
Numeric processor	13	0F0-0FE	
IDE controller (primary)	14	1F0-1F7, 3F6	
IDE controller (secondary)	15	170-177, 376	

i	IRQ 2, 3, 5, 11 are available for additional devices

„IRQ" = interrupt assigned as shipped

„Address" = this address can be used for your particular device

„DMA" = this DMA can be used for your particular device

Default settings are shown in bold print.

3.3.2   PCI resources

PCI IRQ Line x - Assignment of the PCI interrupts

PCI IRQ Line x defines which ISA interrupts are used for the separate PCI slots.

If you select *Auto* in the BIOS setup, the interrupts are assigned automatically and no further settings are required.

Multifunctional PCI boards or boards with an integrated PCI-to-PCI bridge can use several PCI interrupts (INTA#, INTB#, INTC#, INTD#). Mono functional PCI boards (default) only use one PCI interrupt (INTA#) per PCI slot.

The PCI interrupts INTA#, INTB#, INTC# and INTD# are available for each PCI slot.

The same interrupt can be assigned simultaneously to several PCI boards. You should avoid this condition due to reduced performance.

If you use a setting other than *Auto*, the Plug&Play functionality of the system BIOS for the corresponding PCI boards is deactivated.

Auto   The PCI interrupts are assigned automatically in accordance with the Plug&Play guidelines.

Disabled   No ISA interrupt is assigned to the PCI interrupt.

3, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15

                The selected ISA interrupt is assigned to the PCI interrupt. You may not select an ISA interrupt that is used by a component on the system board (e.g. controller) or an ISA board.

Following table shows the PCI IRQ routing:

Device	IDSEL	PCI_IRQ	REQ/GNT
VGA/Rage XL	PCI_AD17	PCI_IRQA	REQ#0 / GNT#0

Following table shows the PCI-X 66 MHz IRQ routing:

Device	IDSEL	PCI_IRQ	REQ/GNT
PCIX slot 1	ESB_PXAD19	ESB_PXI RQ#2/ ESB_PXI RQ#1/ ESB_PXI RQ#0/ ESB_PXI RQ#3	ESB_PXREQ#0 ESB_PXGNT#0
LSI 1068	ESB_PXAD21	ESB_PXI RQ#0	ESB_PXREQ#1 ESB_PXGNT#1
PCIX slot 2	PXH_PAAD19	PX_IRQ3 / PX_IRQ0 / PX_IRQ1 / PX_IRQ2	PXH_PAREQ#0 PXH_PAGNT#0

Following table shows the PCI -X133 MHz IRQ routing:

Device	IDSEL	PCI_IRQ	REQ/GNT
PCIX slot 1	PCIA_AD17	PCIA_IRQ0 / PCIA_IRQ1 / PCIA_IRQ2 / PCIA_IRQ3	REQ#0 / GNT#0

IDSEL: ID select
PCI_IRQ: PCI Interrupt Request
REQ/GNT: Request / Grant

3.4   Screen resolution

Depending on the operating system used the screen resolutions in the following table refer to the screen controller on the system board. If you are using an external screen controller, you will find details of supported screen resolutions in the operating manual or technical manual supplied with the controller.

Screen resolution	Refresh rate (Hz)	Max. number of colours
640x480	85	16 Mio.
800x600	85	16 Mio.
1024x768	85	65536
1280x1024	85	256

3.5   Temperature / system monitoring

Temperature and system monitoring aim to reliably protect the computer hardware against damage caused by overheating. In addition, any unnecessary noise is also prevented by reducing the fan speed, and information is provided about the system status.

The temperature and system monitoring are controlled by an onboard controller developed by Fujitsu Siemens.

The following functions are supported:

Temperature monitoring

Measurement of the processor temperature, measurement of the ambient temperature by a temperature sensor on the LED board.

Fan monitoring

Fans that are no longer available, blocked or sticky fans are detected.

Fan control

The fans are regulated according to temperature.

Sensor monitoring

The removal of, or a fault in, a temperature sensor is detected. Should this happen all fans monitored by this sensor run at maximum speed, to achieve the greatest possible protection of the hardware.

Power monitoring

When voltage exceeds warning level high or falls below warning level low an alert will be generated.

System Event Log (SEL)

All monitored events of the system board are signalised via the Global Error LED and recorded in the System Event Log. They could be retrieved in the BIOS Setup or via ServerView.
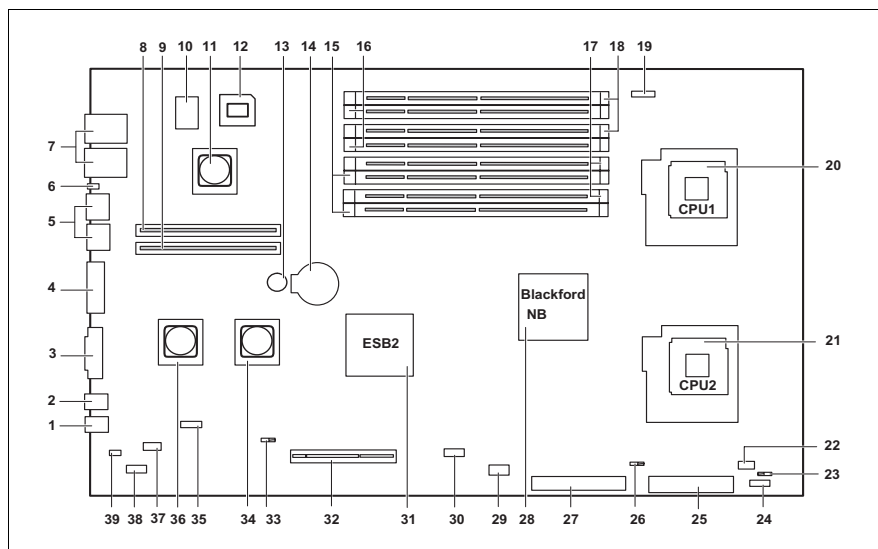
3.6   Interfaces and Connectors

Figure 4: Schematic overview of the system board D2300

1	PS/2 mouse port	21	Intel LGA771 processor 2 socket
2	PS/2 keyboard port	22	PSU I^2 connector
3	Serial port COM	23	Backplane board HDD LED cable connector
4	Video port	24	connector for board fan
5	Rear side USB ports	25	system board power plug
6	Top: Rear system health LED indicator (amber) Bottom: Rear UID LED indicator (blue)	26	Power On control connector (JP1)
7	GbE LAN ports	27	connector for IDE data cable
8	PCI-X expansion slot	28	Intel MCH chipset (north bridge)
9	PCI Express x8 expansion slot	29	sytem configuration switch (sw1)
10	SMSC DME1737 Super I/O Chipset	30	SATA connector

| 11	Broadcom BCM5715 Gigabit Ethernet controller	31	Intel ESB2 chipset (south bridge)
12	Firmware hub	32	SAS cable connector
13	Internal piezoelectric beep	33	Clear CMOS jumper (JP2)
14	System RTC battery	34	LSI 1068 onboard SAS controller
15	Bank 1 DIMM slots (FBD 1A, FBD 1B)	35	JTAG connector
16	Bank 2 DIMM slots (FBD 1C, FBD 1D)	36	iRMC chipset
17	Bank 3 DIMM slots (FBD 2A, FBD 2B)	37	iPMB connector
18	Bank 4 DIMM slots (FBD 2C, FBD 2D)	38	KVM switch connector
19	Front USB ports system board connector	39	COM2 port connector
20	Intel LGA771 processor 1 socket		

3.6.1   External ports
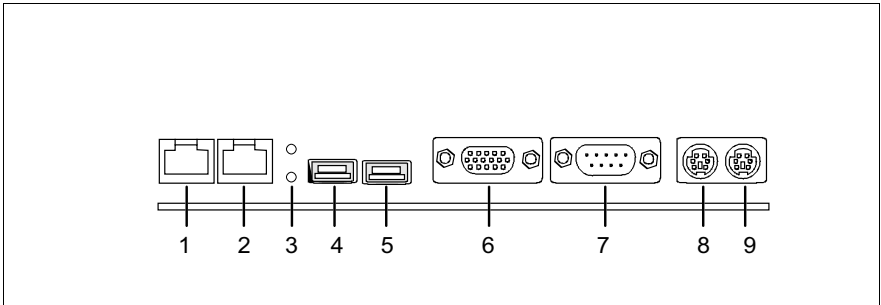
Figure 5: External ports of the system board D2300

1	LAN port 1 (10/100/1000 Mbps)	6	Serial port COM
2	LAN port 2 (10/100/1000 Mbps / iRMC port)	7	VGA port
3	LEDs (Global Error and Status)	8	PS/2 keyboard port
4	USB port1	9	PS/2 mouse port
5	USB port 2		

LEDs

LED	Indicator	Meaning
bottom: Identify-LED	blue	server is identified via ServerView
top: Status-LED (Global Error)	orange	indicates a prefailure
	orange flashing	indicates a failure. Reasons for a failure may be: - overheating of one of the sensors - sensor defect - fan defect - CPU error - Software detected an error

LAN ports

On this system board you will find one Broadcom NetXtreme BMC5715C Gigabit Ethernet Controller (two channel). This LAN controller supports the transfer rates of 10 Mbit/s, 100 Mbit/s and 1 Gbit/s. The LAN controller supports WOL function through Magic Packet™.

FIt is also possible to boot a device without its own boot hard disk via LAN. Here Intel PXE is supported.

The LAN port serves as management interface (iRMC Port) and is prepared for RemoteView.

The LAN controller connectors are equipped with two LEDs (light emitting diode) indicating the transfer rate and the activity:
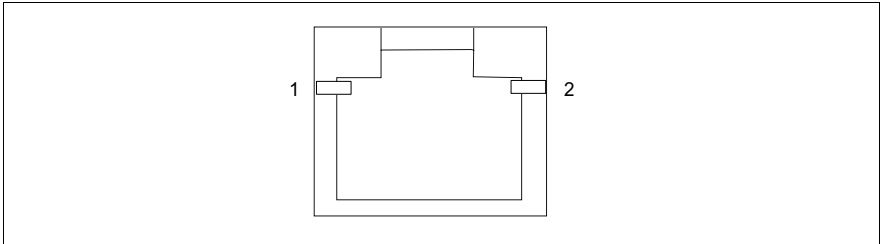
Figure 6: LAN port

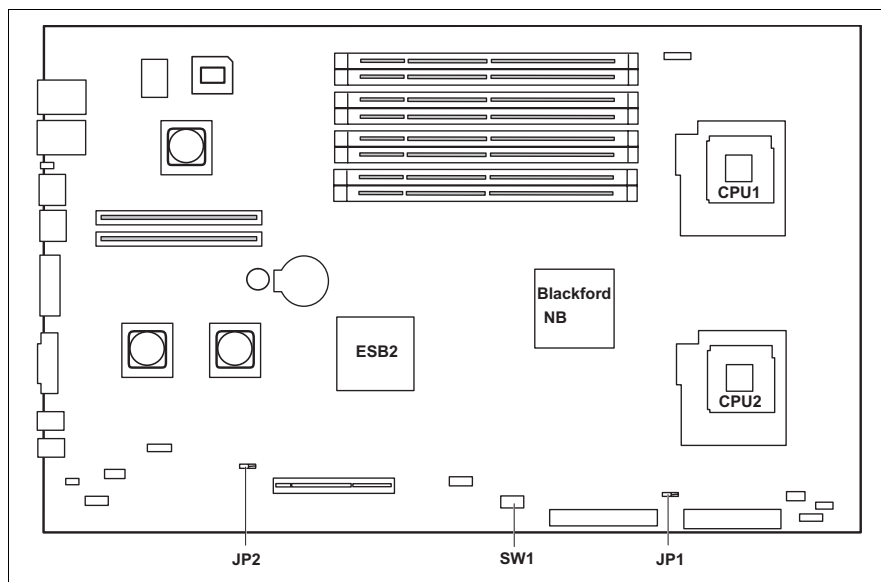| 1	LAN transfer rate	green + yellow	off	transfer rate 10 Mbit/s (or no connection)
		green	on	transfer rate 100 Mbit/s
		yellow	on	transfer rate 1000 Mbit/s
2	LAN-Link/activity	green	on	LAN connection
			off	no LAN connection
			flashing	LAN transfer

3.7   Settings with jumpers

Figure 7: Position of the jumpers

Power-On-Control - jumper 1 (JP1)

1-2   default (default setting: by South Bridge and BMC) via IPMI

2-3   debug (by South Bridge only)

Clear CMOS - jumper 2 (JP2)

1-2   normal, not clear CMOS settings (default setting)

2-3   Clear CMOS settings

System configuration switch (SW1)

Switches	Function	Status	Description
SW1-1	BIOS recovery	On	Boot block enabled
		Off	Normal boot
SW1-2	BIOS password recovery	On	Password disabled
		Off	Password enabled
SW1-3	BIOS write-protect	On	BIOS can only be read
		Off	BIOS can both be read and written to
SW1-4	CMOS clear	On	Clear CMOS settings and restore system defaults
		Off	Normal CMOS settings

i Switch status indicated in **bold text** is the default setting.

4 Replacing the lithium battery

In order to save the system information permanently, a lithium battery is installed to provide the CMOS-memory with a current. When the charge is too low or the battery is empty, a corresponding error message is provided. The lithium battery must then be replaced.

⚠ The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer (CR2450).

Do not throw lithium batteries into the trashcan. It must be disposed of in accordance with local regulations concerning special waste.

Make sure that you insert the battery the right way round. The plus pole must be on the top!
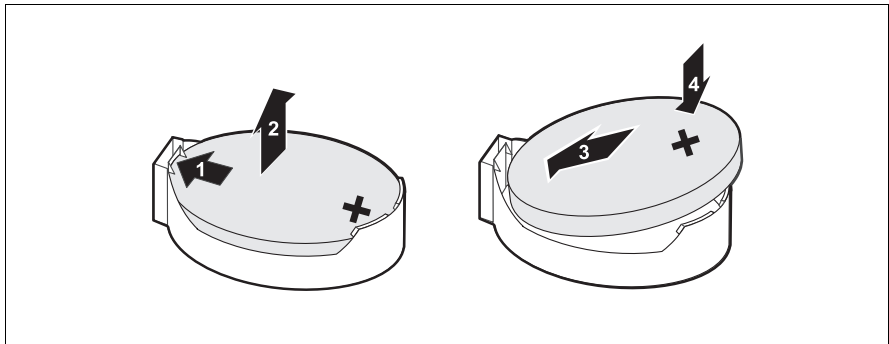

Bild 8: Replacing the lithium battery

► Press the locking spring into direction of of the arrow (1), so that the lithium-battery jumps out of its socket.

► Remove the battery (2).

► Insert a new lithium battery of the same type into the socket (3) and (4).

Abbreviations

The technical terms and abbreviations given below represent only a selection of the full list of common technical terms and abbreviations.

Not all technical terms and abbreviations listed here are valid for the described system board.

ACPI
Advanced Configuration and Power managament Interface

ASSR
Automatic Server Recovery and Restart

ATA
Advanced Technology Attachment

BBU
Battery Backup Unit

BIOS
Basic Input Output System

BMC
Baseboard Management Controller

CMOS
Complementary Metal Oxide Semiconductor

COM
COMmunication port

CPU
Central Processing Unit

DDR
Double Data Rate

DIMM
Dual In-line Memory Module

DIP
>Dual In-line Package

DMI
>Desktop Management Interface

DRAM
>Dynamic Random Access Memory

ECC
>Error Correction Code

EEPROM
>Electrical Erasable Programmable Read Only Memory

EPROM
>Erasable Programmable Read Only Memory

EMRL
>Embedded RAID Logic

EVRD
>Enterprise VRD

HPC
>Hot plug Controller

ICE
>In Circuit Emulation

IDE
>Integrated (intelligent) Drive Electronics

IME
>Integrated Mirror Enhanced

IOOP
>Intelligent Organisation Of PCI

IPMB
>Intelligent Platform Management Bus

IPMI
Intelligent Platform Management Interface

LAN
Local Area Network

LED
Light Emitting Diode

MPS
Multi Processor Specification

NMI
Non Maskable Interrupt

OEM
Original Equipment Manufacturer

OHCI
Open Host Controller Interfache

OS
Operating System

PCI
Peripheral Components Interconnect

PDA
Prefailure Detection and Analyzing

PIO
Programmed Input Output

PLD
Programmable Logic Device

PS(U)
Power Supply (Unit)

PWM
Puls Wide Modulation

PXE
>Preboot eXecution Environment

RAID
>Redundant Array if Inexpensive Disks

RSB
>Remote Service Board

RST
>ReSeT

RTC
>Real Time Clock

SCSI
>Small Computer Systems Interfache

SDDC
>Single Device Data Correction

SDRAM
>Synchronous Dynamic Random Access Memory

SHDG
>Server Hardware Design Guide

SMB
>System Management Bus

SMM
>Server Management Mode

SMP
>Symmetrically Multi Processing

UHCI
>Unified Host Controller Interface

USB
>Universal Serial Bus

VGA

Video Graphics Adapter

VRD

Voltage Regulator Down

VRM

Voltage Regulator Module

WfM

Wired for Management

WOL

Wake up On LAN

Comments
Suggestions
Corrections

Submitted by

Comments on D2300
          Technical Manual

Comments
Suggestions
Corrections

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Comments on D2300
Technical Manual

FUJITSU

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